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## BOOK REVIEWS

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*A First Course in Physics.* By ROBERT ANDREWS MILLIKAN AND HENRY GORDON GALE. Boston: Ginn & Co., 1906. Pp. vi + 488.

A new high-school textbook in physics is not in itself a very notable event these days. The shelf containing these elementary textbooks will soon have to be enlarged if the present rate of appearance of them continues. But there will always be a place for a good elementary book in physics. The increase in the number of such books is not a criticism of present textbooks, but rather shows that, as physics is taught more in the schools, it is found that no single book can satisfy all schools. The conditions of different schools and different teachers call for different books. The present book has grown out of the needs of a number of secondary schools affiliated with the University of Chicago, as we learn from the preface. It is certain to take its place as one of the best of our elementary textbooks. It shows on every page that it is not a mere compilation, but a carefully prepared and fresh presentation. The most recent views of physics are presented in a clear and interesting way. These new views are not tacked on at the ends of the chapters here and there, but are component parts of the presentations and discussions. Thus in electricity, the subject is presented from the electron point of view at the very start, so that the student's whole idea of the subject is formed on that theory. There may, of course, be danger for the young student in such an incorporation of "the newest points of view," for no man changes his views so rapidly and radically as the modern physicist. The authors of this book have, however, been conservative, and have avoided freak theories. A striking feature of the book is the great number of facts given from modern industrial and engineering practice. Thus the types of water-wheels are described and their efficiencies are given in numerical percentages; the types of house-heating systems are explained; ice-machines and cold-storage houses are described with diagrams; a modern telephone circuit is figured; the arrangement of the blades of a modern steam turbine is shown in diagram, and even the speed of turbine steamships is stated with the date of the trip of the vessel that made the record. This encyclopediac knowledge is of course only a small part of physics, but it adds interest to the subject for the live boy. A commendable feature of the book is the series of excellent portraits of the men who have contributed most to physics. The short legends under these portraits, telling what each man did for the world, are very good. The topics treated are those usually found in an advanced high-school text. It is intended that the book be used in connection with a manual of laboratory experiments by the same authors. Frequent reference is made to this laboratory manual, but the manual has not yet been published. The dependence of the textbook upon a special manual (and at times the dependence is vital), is in our judgment a defect for the general use of the book. The book is presented as a course for third-year high-school students. The treatment is not mathematical and is in general very clear. The large high schools with special teachers of physics will find the book not beyond their students, but some schools may have difficulty in properly covering in one year as much as is presented

here. But, as the authors state, omissions must be made. The print and illustrations are such as to add to the attractiveness of the book. The book is certainly one of the best of our high-school textbooks in physics.

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*Introduction to General Inorganic Chemistry.* By ALEXANDER SMITH. New York: The Century Co., 1906. Pp. xviii + 780.

This book is intended for use in a college or university. The subject is treated in a masterly manner, and the subject-matter up to date. The method of treatment shows that it has been written by a teacher who understands the psychology of teaching. It cannot be said, however, to be an "easy book." The author admits in the preface that it contains some "stiff" reading. The beginner in chemistry will need much laboratory work, and considerable explanation from his teacher in conjunction with the text. The book will be particularly useful to the student who has had a previous elementary course in general chemistry. The hypothesis of ions underlies the whole treatment. Theory receives the principal consideration, and great detail in explanations is a feature of the work.

The first four chapters are introductory, and deal for the most part with the various general characteristics of chemical phenomena, the fourth chapter being confined to symbols, formulæ, and equations. Chapters five to thirty-one inclusive deal with the non-metallic elements, together with chapters on the gas laws, the kinetic-molecular hypothesis, solution, molecular and atomic weights, the atomic hypothesis, chemical equilibrium, dissociation in solution, electrolysis, and the chemical behavior of ionic substances. The last fifteen chapters deal with the metallic elements, together with part of a chapter on chemical equilibrium considered quantitatively, and one chapter on electromotive chemistry.

The book is doubtless the very best of its kind and will be found to be particularly strong on explanations in connection with the hypothesis of ions. This, of course, includes much of the book. It is not intended as a reference book. As a textbook of general inorganic chemistry the reviewer knows of no other in which the theory is so thoroughly treated. Several valuable tables are to be found in the book such as those on solubility of compounds; degree of ionization of acids, bases, and salts, and the electromotive series of the metals.

A few minor points that should be corrected in a future edition have attracted the notice of the reviewer as follows: on p. 50 the words "by weight" should doubtless be added to the definition of "equivalent weight." On p. 69 formulæ are derived from the calculated proportional number of atoms in the molecule, the vapor density not being considered, whereas on the next page in the case of phosphoric anhydride the vapor density is taken note of. To the thoughtful beginner the question of the vapor density of sulphur dioxide, p. 69, would probably arise. On p. 72 the definition of "reduction" is not satisfactory for a final definition. On p. 351 the equation in the paragraph on neutralization is not balanced. It seems to the reviewer that more use might have been made of the hypothesis of ions in helping the student to learn to write equations. The writing of equations is a source of trouble to practically all students of chemistry. In cases of double decomposition, especially, if the student is taught to divide the formulæ on the left-hand side of the equation so as to indicate the ions, with their proper signs, and then to indicate